

## Dual Differential Data and Clock D Flip-Flop With Set and Reset

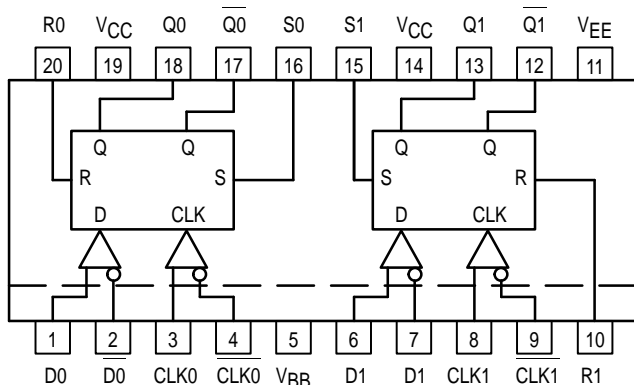
The MC100LVEL29 is a dual master-slave flip flop. The device features fully differential Data and Clock inputs as well as outputs. The MC100EL29 is pin and functionally equivalent to the MC100LVEL29 but is specified for operation at the standard 100E ECL voltage supply. A  $V_{BB}$  output is provided for AC coupling, refer to the interfacing section of the ECLinPS Data Book (DL140) for more information on AC coupling ECL signals. Data enters the master latch when the clock is LOW and transfers to the slave upon a positive transition on the clock input.

The differential inputs have special circuitry which ensures device stability under open input conditions. When both differential inputs are left open the D input will pull down to  $V_{EE}$  and the  $\bar{D}$  input will bias around  $V_{CC}/2$ . The outputs will go to a defined state, however the state will be random based on how the flip flop powers up.

Both flip flops feature asynchronous, overriding Set and Reset inputs. Note that the Set and Reset inputs cannot both be HIGH simultaneously.

- 1100MHz Flip-Flop Toggle Frequency
- 20-lead SOIC Package
- 580ps Propagation Delays

Logic Diagram and Pinout: 20-Lead SOIC (Top View)

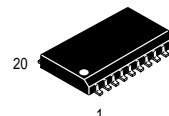


### MC100LVEL29

DC CHARACTERISTICS ( $V_{EE} = -3.0V$  to  $-3.8V$ ;  $V_{CC} = GND$ )

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current		35	50		35	50		35	50		35	50	mA
$V_{BB}$	Output Reference Voltage	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	V
$I_{IH}$	Input HIGH Current			150			150			150			150	$\mu A$
$I_{IL}$	Input LOW Current													$\mu A$
	$D_n$ Inputs	0.5			0.5			0.5			0.5			
	$\bar{D}_n$ Inputs	-300			-300			-300			-300			

## MC100LVEL29 MC100EL29



DW SUFFIX  
PLASTIC SOIC PACKAGE  
CASE 751D-04

### TRUTH TABLE

R	S	D	CLK	Q	$\bar{Q}$
L	L	L	Z	L	H
L	L	H	Z	H	L
H	L	X	X	L	H
L	H	X	X	H	L
H	H	X	X	Undef	Undef

Z = LOW to HIGH Transition

### PIN NAMES

Pins	Function
D0-D1	Data Inputs
R0-R1	Reset Inputs
CLK0-CLK1	Clock Inputs
S0-S1	Set Inputs



# MC100LVEL29 MC100EL29

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### AC CHARACTERISTICS ( $V_{EE} = -3.0V$ to $-3.8V$ ; $V_{CC} = GND$ )

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f <sub>MAX</sub>	Maximum Toggle Frequency	1.1			1.1			1.1			1.1			GHz
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay to Output CLK S, R	480 480		680 700	490 490		690 710	500 500		700 720	520 520		720 740	ps
t <sub>S</sub> t <sub>H</sub>	Setup Time Hold Time	0 100			0 100			0 100			0 100			ps
t <sub>RR</sub>	Set/Reset Recovery	100			100			100			100			ps
t <sub>PW</sub>	Minimum Pulse Width CLK, Set, Reset	400			400			400			400			ps
V <sub>PP</sub>	Minimum Input Swing	150			150			150			150			mV
V <sub>CMR</sub> <sup>1</sup>	Common V <sub>PP</sub> <500mV Mode RangeV <sub>PP</sub> ≥500mV	-2.0 -1.8		-0.4 -0.4	-2.1 -1.9		-0.4 -0.4	-2.1 -1.9		-0.4 -0.4	-2.1 -1.9		-0.4 -0.4	V
t <sub>r</sub> t <sub>f</sub>	Output Rise/Fall Times Q (20% – 80%)	280		550	280		550	280		550	280		550	ps

1. The CMR range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V<sub>PPmin</sub> and 1V. The lower end of the CMR range varies 1:1 with V<sub>EE</sub>. The numbers in the spec table assume a nominal V<sub>EE</sub> = -3.3V. Note for PECL operation, the V<sub>CMR(min)</sub> will be fixed at 3.3V – |V<sub>CMR(min)</sub>|.

## MC100EL29

### DC CHARACTERISTICS ( $V_{EE} = -4.2V$ to $-5.5V$ ; $V_{CC} = GND$ )

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I <sub>EE</sub>	Power Supply Current		35	50		35	50		35	50		35	50	mA
V <sub>BB</sub>	Output Reference Voltage	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	V
I <sub>IH</sub>	Input HIGH Current			150			150			150			150	μA
I <sub>IL</sub>	Input LOW Current Dn Inputs Dn Inputs	0.5 -300			0.5 -300			0.5 -300			0.5 -300			μA

## MC100EL29

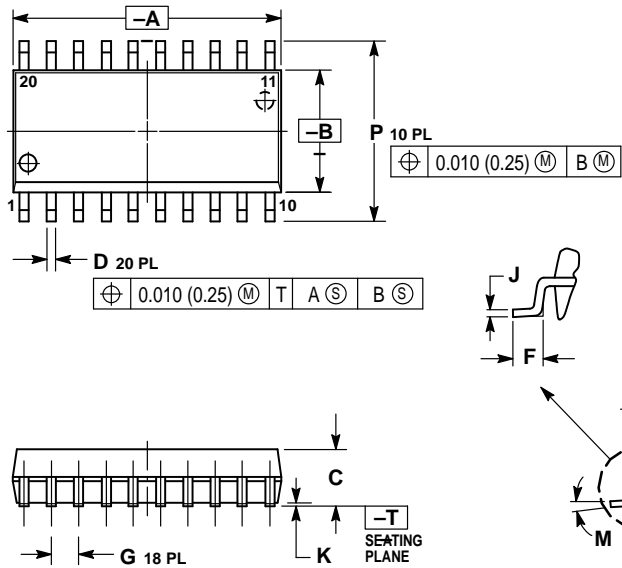
### AC CHARACTERISTICS ( $V_{EE} = -4.2V$ to $-5.5V$ ; $V_{CC} = GND$ )

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f <sub>MAX</sub>	Maximum Toggle Frequency	1.1			1.1			1.1			1.1			GHz
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay to Output CLK S, R	480 480		680 700	490 490		690 710	500 500		700 720	520 520		720 740	ps
t <sub>S</sub> t <sub>H</sub>	Setup Time Hold Time	0 100			0 100			0 100			0 100			ps
t <sub>RR</sub>	Set/Reset Recovery	100			100			100			100			ps
t <sub>PW</sub>	Minimum Pulse Width CLK, Set, Reset	400			400			400			400			ps
V <sub>PP</sub>	Minimum Input Swing	150			150			150			150			mV
V <sub>CMR</sub> <sup>1</sup>	Common V <sub>PP</sub> <500mV Mode RangeV <sub>PP</sub> ≥500mV	-3.2 -3.0		-0.4 -0.4	-3.3 -3.1		-0.4 -0.4	-3.3 -3.1		-0.4 -0.4	-3.3 -3.1		-0.4 -0.4	V
t <sub>r</sub> t <sub>f</sub>	Output Rise/Fall Times Q (20% – 80%)	280		550	280		550	280		550	280		550	ps

1. The CMR range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between V<sub>PPmin</sub> and 1V. The lower end of the CMR range varies 1:1 with V<sub>EE</sub>. The numbers in the spec table assume a nominal V<sub>EE</sub> = -4.5V. Note for PECL operation, the V<sub>CMR(min)</sub> will be fixed at 5.0V – |V<sub>CMR(min)</sub>|.


OUTLINE DIMENSIONS

DW SUFFIX  
PLASTIC SOIC PACKAGE  
CASE 751D-04  
ISSUE E



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: MILLIMETER.
  3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
  4. MAXIMUM MOLD PROTRUSION 0.150 (0.006) PER SIDE.
  5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 (0.005) TOTAL IN EXCESS OF D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	12.65	12.95	0.499	0.510
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

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